In [ ]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

In [ ]:
```
df = pd.read_csv("Mastercard_stock_history.csv", index_col = "Date", parse_dates = ["Date"], dayfirst=True)
df.head()
```

Out[ ]:

Date	Open	High	Low	Close	Volume	Dividends	Stock Splits
2006-05-25	3.748967	4.283869	3.739664	4.279217	395343000	0.0	0
2006-05-26	4.307126	4.348058	4.103398	4.179680	103044000	0.0	0
2006-05-30	4.183400	4.184330	3.986184	4.093164	49898000	0.0	0
2006-05-31	4.125723	4.219679	4.125723	4.180608	30002000	0.0	0
2006-06-01	4.179678	4.474572	4.176887	4.419686	62344000	0.0	0

In [ ]:
```
df.drop(["Dividends","Stock Splits"], axis=1, inplace=True)
df
```

Out[ ]:

Date	Open	High	Low	Close	Volume
2006-05-25	3.748967	4.283869	3.739664	4.279217	395343000
2006-05-26	4.307126	4.348058	4.103398	4.179680	103044000
2006-05-30	4.183400	4.184330	3.986184	4.093164	49898000
2006-05-31	4.125723	4.219679	4.125723	4.180608	30002000
2006-06-01	4.179678	4.474572	4.176887	4.419686	62344000
...	...	...	...	...	...
2021-10-05	347.121403	348.130138	342.497240	342.776886	4724100
2021-10-06	339.580960	348.439763	338.682072	348.250000	3712000
2021-10-07	349.000000	357.899994	349.000000	353.910004	3209200
2021-10-08	356.000000	360.369995	354.209992	354.959992	2336700
2021-10-11	353.950012	354.880005	346.899994	347.149994	2766800

3872 rows × 5 columns

In [ ]:
```
df.describe()
```

Out[ ]:

	Open	High	Low	Close	Volume
count	3872.000000	3872.000000	3872.000000	3872.000000	3.872000e+03
mean	104.896814	105.956054	103.769349	104.882714	1.232250e+07
std	106.245511	107.303589	105.050064	106.168693	1.759665e+07
min	3.748967	4.102467	3.739664	4.083861	6.411000e+05
25%	22.347203	22.637997	22.034458	22.300391	3.529475e+06
50%	70.810079	71.375896	70.224002	70.856083	5.891750e+06
75%	147.688448	148.645373	146.822013	147.688438	1.319775e+07
max	392.653890	400.521479	389.747812	394.685730	3.953430e+08

In [ ]:
```
df.isna().sum()
```

Out[ ]:
```
Open      0
High      0
Low       0
Close     0
Volume    0
dtype: int64
```

In [ ]:
```
#### can not randomly devide the dataset
```

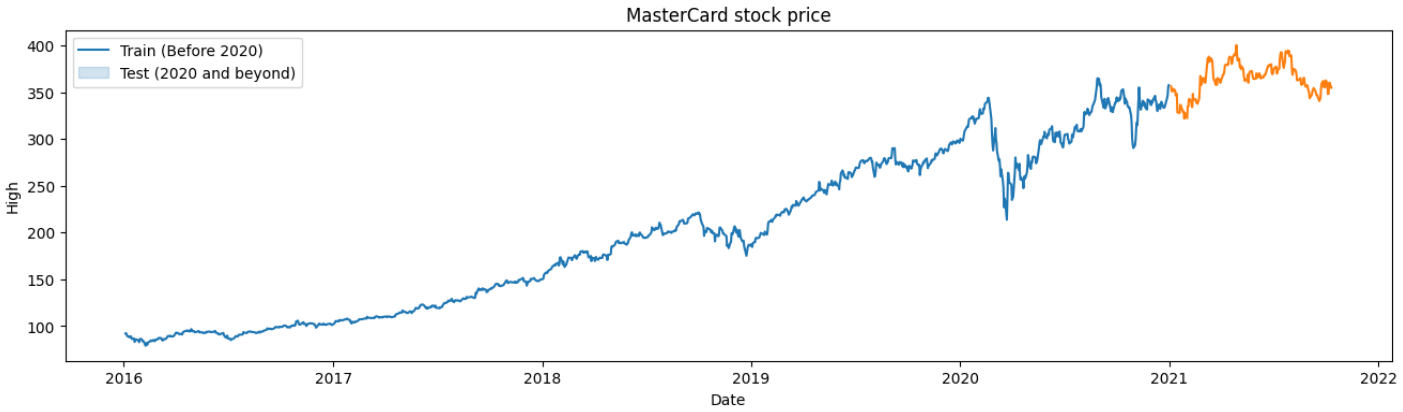
In [ ]:
```
pred_col = "High"
```

```
stock_prices = df[pred_col]
```

In [ ]:
```
def train_test_plot(tstart, tend):
    plt.figure(figsize=(16,4))
    sns.lineplot(stock_prices[f"{tstart}" : f"{tend}"])
    sns.lineplot(stock_prices[f"{tend + 1}" : ])
    plt.legend([f"Train (Before {tend})", f"Test ({tend} and beyond)"])
    plt.title("MasterCard stock price")
    plt.show()
```

In [ ]:
```
tstart = 2016
tend = 2020
```

In [ ]:
```
train_test_plot(tstart, tend)
```



In [ ]:
```
def train_test_split(tstart, tend):
    train = stock_prices.loc[f"{tstart}":f"{tend}"].values
    test = stock_prices.loc[f"{tend+1}":].values
    return train, test
```

In [ ]:
```
n_steps = 60
training_set, test_set = train_test_split(tstart, tend)
input_set = stock_prices[df.shape[0] - test_set.shape[0] - n_steps : ].values
```

In [ ]:
```
training_set.shape, test_set.shape, input_set.shape
```

Out[ ]:
```
((1259,), (195,), (255,))
```

In [ ]:
```
from sklearn.preprocessing import MinMaxScaler
```

In [ ]:
```
sc = MinMaxScaler(feature_range = (0,1))
sc.fit(np.expand_dims(np.concatenate((training_set, input_set)), axis=1))

training_set = sc.transform(np.expand_dims(training_set, axis=1))
input_set = sc.transform(np.expand_dims(input_set, axis=1))
```

In [ ]:
```
def split_sequence(sequence):
    X, y = list(), list()
    for i in range(len(sequence) - n_steps):
        X.append(sequence[i : i + n_steps])
        y.append(sequence[i + n_steps])
    return np.array(X), np.array(y)
```

In [ ]:
```
X_train, y_train = split_sequence(training_set)
X_input, y_true = split_sequence(input_set)
```

In [ ]:
```
X_train.shape, y_train.shape, X_input.shape, y_true.shape
```

Out[ ]:
```
((1199, 60, 1), (1199, 1), (195, 60, 1), (195, 1))
```

In [ ]:
```
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import LSTM, Dense, Bidirectional, GRU
```

In [ ]:
```
model_lstm = Sequential()
model_lstm.add(Bidirectional(GRU(units = 128, return_sequences = True, activation = "tanh", input_shape = (n_st
model_lstm.add(Bidirectional(GRU(units = 128)))
model_lstm.add(Dense(1))
model_lstm.compile(optimizer = "RMSprop", loss = "mse")
```

In [ ]:
```
model_lstm.fit(X_train, y_train, epochs = 25, batch_size = 32, verbose=1)
```

```
Epoch 1/25
```

```
2023-06-16 04:15:39.073978: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with dtype int32
         [[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]
2023-06-16 04:15:39.075957: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype int32
         [[{{node gradients/split_grad/concat/split/split_dim}}]]
2023-06-16 04:15:39.077446: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with dtype int32
         [[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]
2023-06-16 04:15:39.190912: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/ReverseV2_grad/ReverseV2/ReverseV2/axis' with dtype int32 and s
hape [1]
         [[{{node gradients/ReverseV2_grad/ReverseV2/ReverseV2/axis}}]]
2023-06-16 04:15:39.218408: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with dtype int32
         [[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]
2023-06-16 04:15:39.219426: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype int32
         [[{{node gradients/split_grad/concat/split/split_dim}}]]
2023-06-16 04:15:39.220359: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with dtype int32
         [[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]
2023-06-16 04:15:39.388457: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with dtype int32
         [[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]
2023-06-16 04:15:39.389860: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype int32
         [[{{node gradients/split_grad/concat/split/split_dim}}]]
2023-06-16 04:15:39.390829: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with dtype int32
         [[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]
2023-06-16 04:15:39.506047: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/ReverseV2_grad/ReverseV2/ReverseV2/axis' with dtype int32 and s
hape [1]
         [[{{node gradients/ReverseV2_grad/ReverseV2/ReverseV2/axis}}]]
2023-06-16 04:15:39.538212: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with dtype int32
         [[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]
2023-06-16 04:15:39.539373: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype int32
         [[{{node gradients/split_grad/concat/split/split_dim}}]]
2023-06-16 04:15:39.540777: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with dtype int32
         [[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]
2023-06-16 04:15:39.705821: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with dtype int32
         [[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]
2023-06-16 04:15:39.707944: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype int32
         [[{{node gradients/split_grad/concat/split/split_dim}}]]
2023-06-16 04:15:39.709628: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with dtype int32
         [[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]
2023-06-16 04:15:39.840568: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/ReverseV2_grad/ReverseV2/ReverseV2/axis' with dtype int32 and s
hape [1]
         [[{{node gradients/ReverseV2_grad/ReverseV2/ReverseV2/axis}}]]
2023-06-16 04:15:39.873967: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with dtype int32
         [[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]
2023-06-16 04:15:39.875336: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype int32
```

```
         [[{{node gradients/split_grad/concat/split/split_dim}}]]
2023-06-16 04:15:39.876860: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with dtype int32
         [[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]
2023-06-16 04:15:40.050528: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with dtype int32
         [[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]
2023-06-16 04:15:40.053378: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype int32
         [[{{node gradients/split_grad/concat/split/split_dim}}]]
2023-06-16 04:15:40.054705: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with dtype int32
         [[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]
2023-06-16 04:15:40.186231: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/ReverseV2_grad/ReverseV2/ReverseV2/axis' with dtype int32 and s
hape [1]
         [[{{node gradients/ReverseV2_grad/ReverseV2/ReverseV2/axis}}]]
2023-06-16 04:15:40.222983: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with dtype int32
         [[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]
2023-06-16 04:15:40.224854: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype int32
         [[{{node gradients/split_grad/concat/split/split_dim}}]]
2023-06-16 04:15:40.226408: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with dtype int32
         [[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]
2023-06-16 04:15:40.828630: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/ReverseV2_grad/ReverseV2/ReverseV2/axis' with dtype int32 and s
hape [1]
         [[{{node gradients/ReverseV2_grad/ReverseV2/ReverseV2/axis}}]]
2023-06-16 04:15:41.291796: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/ReverseV2_grad/ReverseV2/ReverseV2/axis' with dtype int32 and s
hape [1]
         [[{{node gradients/ReverseV2_grad/ReverseV2/ReverseV2/axis}}]]
2023-06-16 04:15:41.569355: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with dtype int32
         [[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]
2023-06-16 04:15:41.571031: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype int32
         [[{{node gradients/split_grad/concat/split/split_dim}}]]
2023-06-16 04:15:41.572258: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with dtype int32
         [[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]
2023-06-16 04:15:41.682622: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/ReverseV2_grad/ReverseV2/ReverseV2/axis' with dtype int32 and s
hape [1]
         [[{{node gradients/ReverseV2_grad/ReverseV2/ReverseV2/axis}}]]
2023-06-16 04:15:41.714582: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with dtype int32
         [[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]
2023-06-16 04:15:41.716393: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype int32
         [[{{node gradients/split_grad/concat/split/split_dim}}]]
2023-06-16 04:15:41.717779: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with dtype int32
         [[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]
2023-06-16 04:15:41.857247: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with dtype int32
         [[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]
2023-06-16 04:15:41.858961: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype int32
         [[{{node gradients/split_grad/concat/split/split_dim}}]]
2023-06-16 04:15:41.860242: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
```

```
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with dtype int32
         [[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]
2023-06-16 04:15:42.239476: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/ReverseV2_grad/ReverseV2/ReverseV2/axis' with dtype int32 and s
hape [1]
         [[{{node gradients/ReverseV2_grad/ReverseV2/ReverseV2/axis}}]]
2023-06-16 04:15:42.271285: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with dtype int32
         [[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]
2023-06-16 04:15:42.272546: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype int32
         [[{{node gradients/split_grad/concat/split/split_dim}}]]
2023-06-16 04:15:42.273793: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with dtype int32
         [[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]
2023-06-16 04:15:42.682153: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/ReverseV2_grad/ReverseV2/ReverseV2/axis' with dtype int32 and s
hape [1]
         [[{{node gradients/ReverseV2_grad/ReverseV2/ReverseV2/axis}}]]
2023-06-16 04:15:43.062639: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/ReverseV2_grad/ReverseV2/ReverseV2/axis' with dtype int32 and s
hape [1]
         [[{{node gradients/ReverseV2_grad/ReverseV2/ReverseV2/axis}}]]
38/38 [==============================] - 11s 149ms/step - loss: 0.0131
Epoch 2/25
38/38 [==============================] - 5s 140ms/step - loss: 0.0041
Epoch 3/25
38/38 [==============================] - 5s 135ms/step - loss: 0.0025
Epoch 4/25
38/38 [==============================] - 5s 132ms/step - loss: 0.0020
Epoch 5/25
38/38 [==============================] - 5s 132ms/step - loss: 0.0019
Epoch 6/25
38/38 [==============================] - 5s 133ms/step - loss: 0.0015
Epoch 7/25
38/38 [==============================] - 6s 152ms/step - loss: 0.0015
Epoch 8/25
38/38 [==============================] - 6s 144ms/step - loss: 0.0013
Epoch 9/25
38/38 [==============================] - 6s 168ms/step - loss: 0.0014
Epoch 10/25
38/38 [==============================] - 7s 174ms/step - loss: 0.0011
Epoch 11/25
38/38 [==============================] - 6s 163ms/step - loss: 9.3441e-04
Epoch 12/25
38/38 [==============================] - 7s 172ms/step - loss: 8.8644e-04
Epoch 13/25
38/38 [==============================] - 6s 158ms/step - loss: 0.0011
Epoch 14/25
38/38 [==============================] - 6s 157ms/step - loss: 8.3647e-04
Epoch 15/25
38/38 [==============================] - 6s 156ms/step - loss: 0.0011
Epoch 16/25
38/38 [==============================] - 6s 159ms/step - loss: 8.2024e-04
Epoch 17/25
38/38 [==============================] - 6s 157ms/step - loss: 8.1782e-04
Epoch 18/25
38/38 [==============================] - 6s 146ms/step - loss: 9.5486e-04
Epoch 19/25
38/38 [==============================] - 5s 140ms/step - loss: 7.0578e-04
Epoch 20/25
38/38 [==============================] - 5s 141ms/step - loss: 8.1797e-04
Epoch 21/25
38/38 [==============================] - 5s 142ms/step - loss: 7.0665e-04
Epoch 22/25
38/38 [==============================] - 5s 140ms/step - loss: 7.1021e-04
Epoch 23/25
38/38 [==============================] - 5s 141ms/step - loss: 7.0578e-04
Epoch 24/25
38/38 [==============================] - 6s 145ms/step - loss: 5.8820e-04
Epoch 25/25
38/38 [==============================] - 6s 150ms/step - loss: 6.0143e-04
```

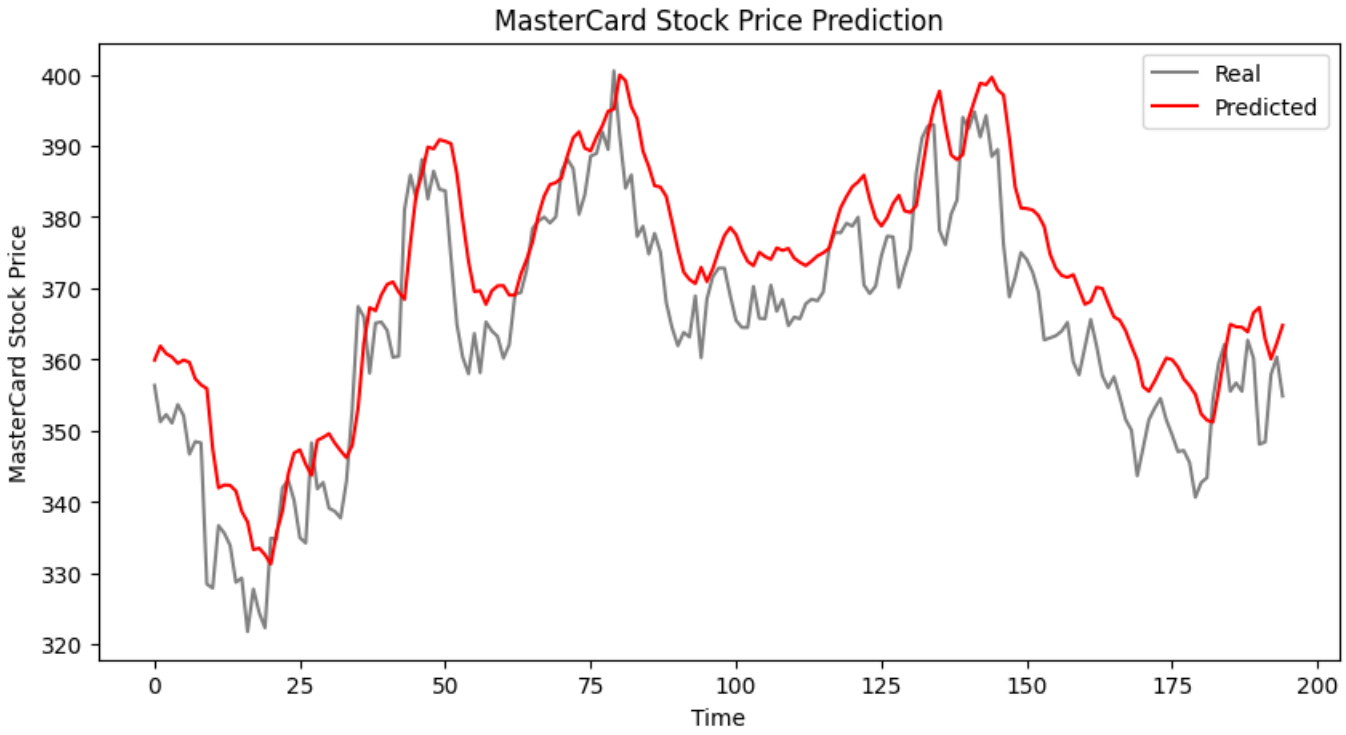
Out[ ]: <keras.callbacks.History at 0x7fdee97f7070>

In [ ]:
```
predicted_stock_price = sc.inverse_transform(model_lstm.predict(X_input))
```

```
2023-06-16 04:19:55.466066: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with dtype int32
         [[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]
2023-06-16 04:19:55.468256: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype int32
         [[{{node gradients/split_grad/concat/split/split_dim}}]]
2023-06-16 04:19:55.469297: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with dtype int32
         [[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]
2023-06-16 04:19:55.583261: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/ReverseV2_grad/ReverseV2/ReverseV2/axis' with dtype int32 and s
hape [1]
         [[{{node gradients/ReverseV2_grad/ReverseV2/ReverseV2/axis}}]]
2023-06-16 04:19:55.613414: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with dtype int32
         [[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]
2023-06-16 04:19:55.614380: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype int32
         [[{{node gradients/split_grad/concat/split/split_dim}}]]
2023-06-16 04:19:55.615399: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with dtype int32
         [[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]
2023-06-16 04:19:55.754338: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with dtype int32
         [[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]
2023-06-16 04:19:55.755974: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype int32
         [[{{node gradients/split_grad/concat/split/split_dim}}]]
2023-06-16 04:19:55.757156: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with dtype int32
         [[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]
2023-06-16 04:19:55.871754: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/ReverseV2_grad/ReverseV2/ReverseV2/axis' with dtype int32 and s
hape [1]
         [[{{node gradients/ReverseV2_grad/ReverseV2/ReverseV2/axis}}]]
2023-06-16 04:19:55.901405: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with dtype int32
         [[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]
2023-06-16 04:19:55.902524: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype int32
         [[{{node gradients/split_grad/concat/split/split_dim}}]]
2023-06-16 04:19:55.903398: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Exec
utor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You mus
t feed a value for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with dtype int32
         [[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]
7/7 [==============================] - 1s 38ms/step
```

In [ ]:
```
def plot_predictions(test, predicted):
    plt.figure(figsize = (10,5))
    plt.plot(test, color="gray", label="Real")
    plt.plot(predicted, color="red", label="Predicted")
    plt.title("MasterCard Stock Price Prediction")
    plt.xlabel("Time")
    plt.ylabel("MasterCard Stock Price")
    plt.legend()
    plt.show()
```

In [ ]:
```
plot_predictions(test_set, predicted_stock_price)
```



In [ ]:
```
from sklearn.metrics import mean_squared_error, mean_absolute_error
```

In [ ]:
```
rmse = mean_squared_error(test_set, predicted_stock_price) ** 0.5
mae = mean_absolute_error(test_set, predicted_stock_price)

print("Absolute error :", mae)
print("Root Mean Squared error :", rmse)
```

```
Absolute error : 7.941693811175881
Root Mean Squared error : 9.34993332617607
```